# ECS SDP Internal Training

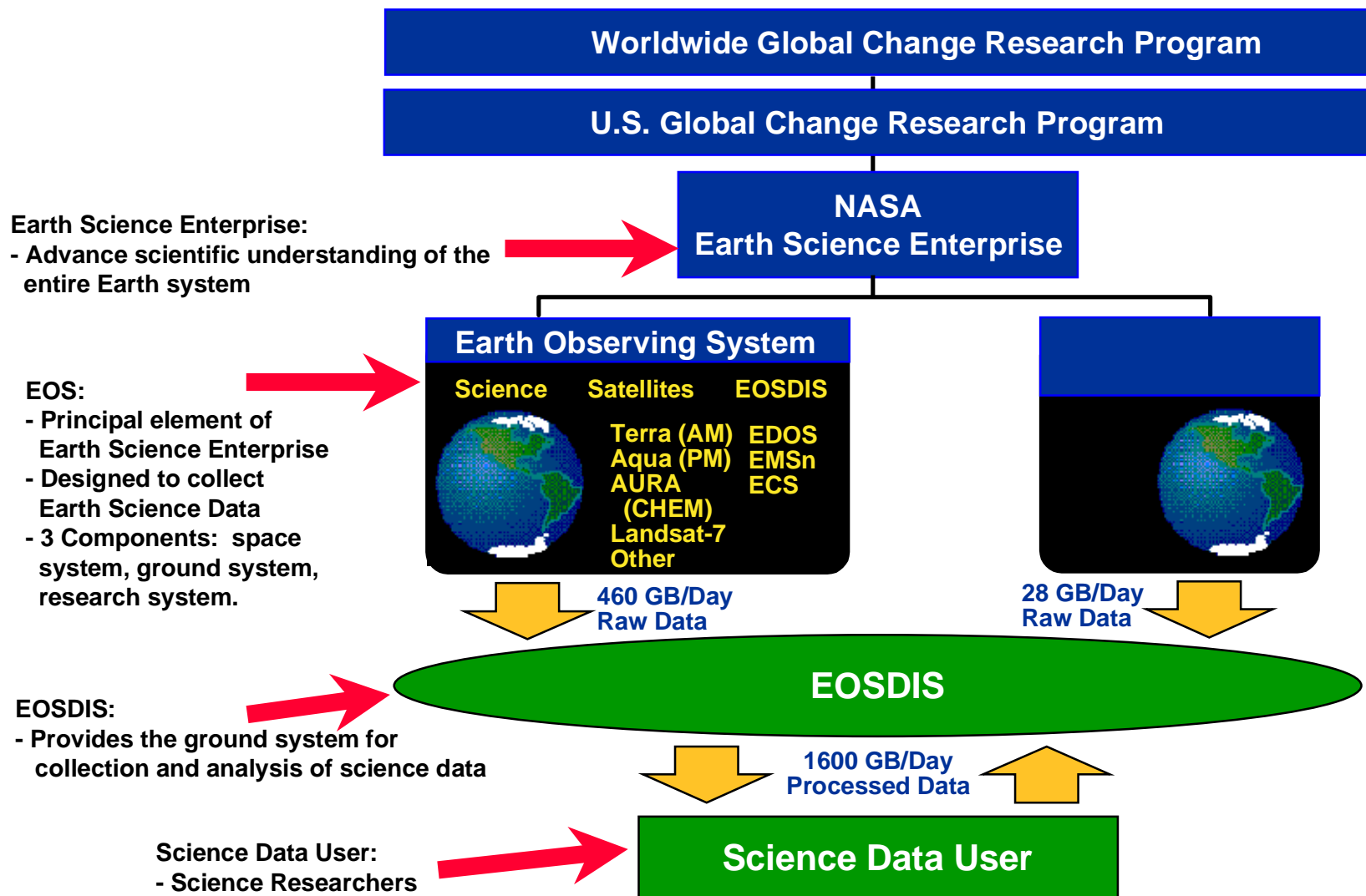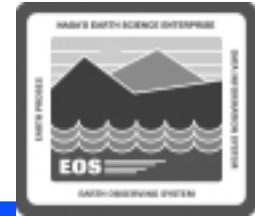625-CD-620-001
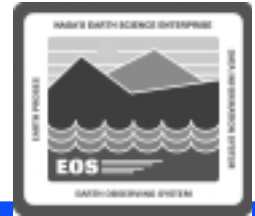
Objectives

- **Overall objective: Describe ECS structure and function for Science Data Processing (SDP)**
  - **Identify subsystems and Computer Software Configuration Items (CSCIs)**
  - **Specify major components and functions/processes of CSCIs**
  - **Describe role of CSCIs/functions/processes in the context of ECS operational scenarios**
    - **ASTER-specific functions (e.g., DAR, expedited data support)**
    - **Producing and distributing data products (including media)**
    - **Updating QA metadata**
    - **On-demand processing**
    - **User registration**
    - **Landsat data insertion and access**

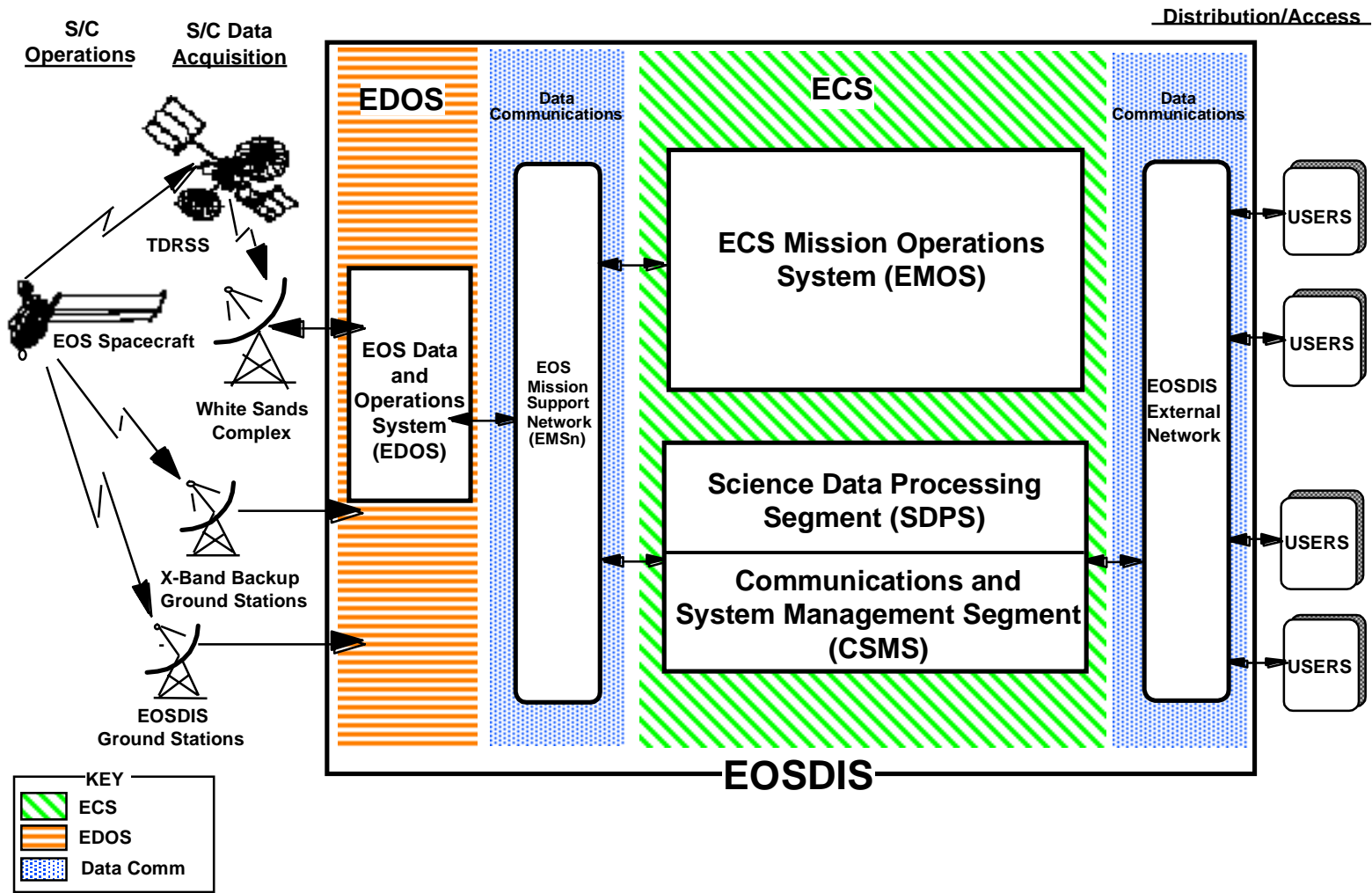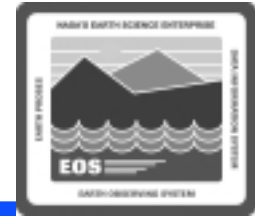625-CD-620-001

What This Lesson Is (and Is Not)
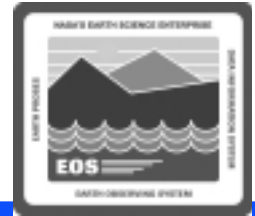
- **Is**
  - Brief illustration of ECS high-level structure
  - Introduction to subsystems that make up ECS at a site
  - Examination of each subsystem and its Computer Software Configuration Items (CSCIs), with components
    - Introduction of all system elements and brief description of functions
    - Background for subsequent scenario-based presentation of system functional flows
  - Detailed look at system functioning in the context of operational scenarios
- **Is Not**
  - Full description of overall ECS structure and function
  - Description of specific individual ECS entities (e.g., SMC)
  - Software development lesson
  - Complete description of interfaces and event sequences
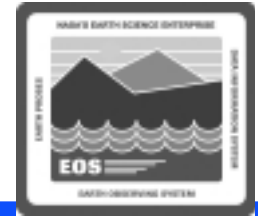 - Operations training

Program Overview

Worldwide Global Change Research Program

U.S. Global Change Research Program

NASA Earth Science Enterprise

Earth Science Enterprise:
- **Advance scientific understanding of the entire Earth system**

Earth Observing System

Science	Satellites	EOSDIS
	Terra (AM)	EDOS
	Aqua (PM)	EMSn
	AURA	ECS
	(CHEM)	
	Landsat-7	
	Other	

EOS:
- **Principal element of Earth Science Enterprise**
- **Designed to collect Earth Science Data**
- **3 Components: space system, ground system, research system.**

460 GB/Day Raw Data

28 GB/Day Raw Data

EOSDIS

EOSDIS:
- **Provides the ground system for collection and analysis of science data**

1600 GB/Day Processed Data

Science Data User

Science Data User:
- **Science Researchers**

EOSDIS Principal Components

EOSDIS Data Flow

DAACs

ASF   GSFC   LaRC   NSIDC
EDC   JPL   SEDAC   ORNL

Science Data Processing

EDOS

EOS Mission Support Network (EMSn)

Flight Dynamics System

ECS Mission Operations System (EMOS)

Data

Communications and Internetworking Infrastructure

Science Investigator-led Processing Systems (SIPS)

International Partners

Version 0

Data from other Mission Data Systems (Landsat-7, TRMM, UARS, . . .)

External Networks (NI/NSF)

Instrument Support Toolkit PI/TL Facility

Affiliated Data Centers/Other Data Centers

Science Community

Investigators Working Group

Science Computing Facilities
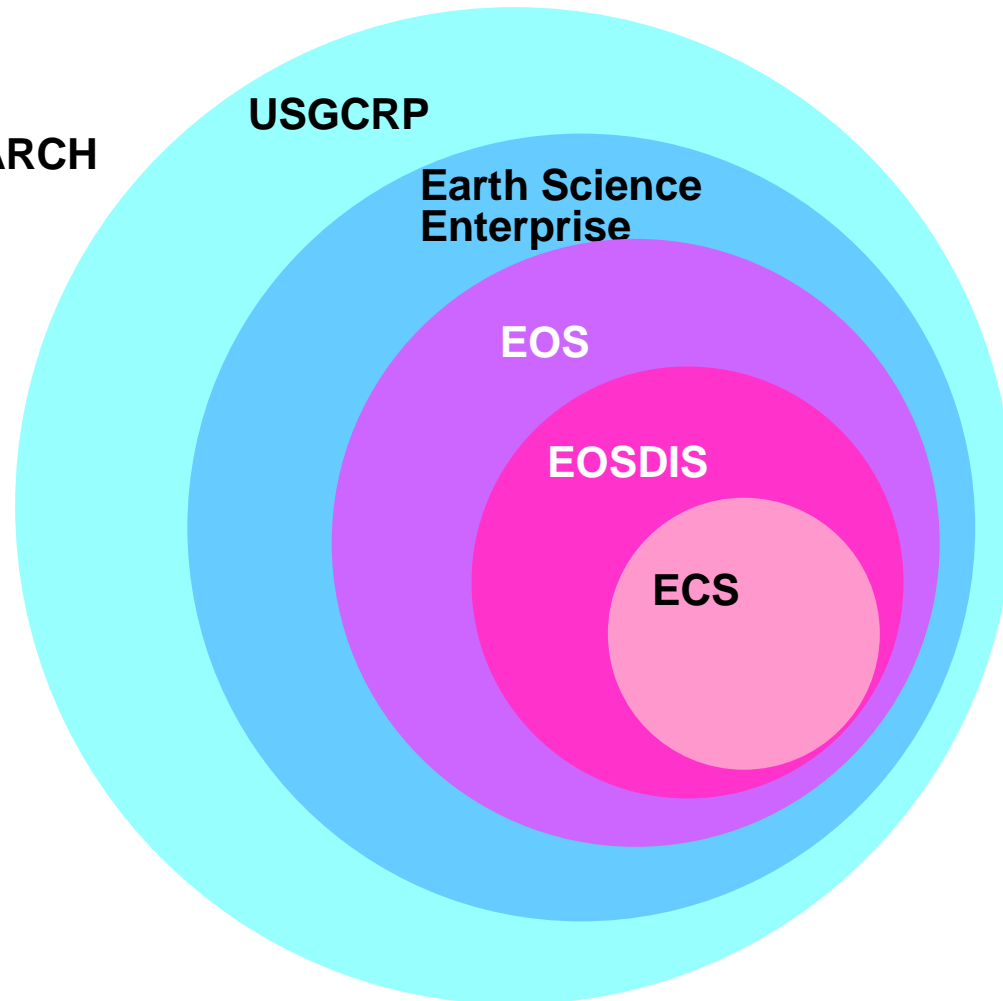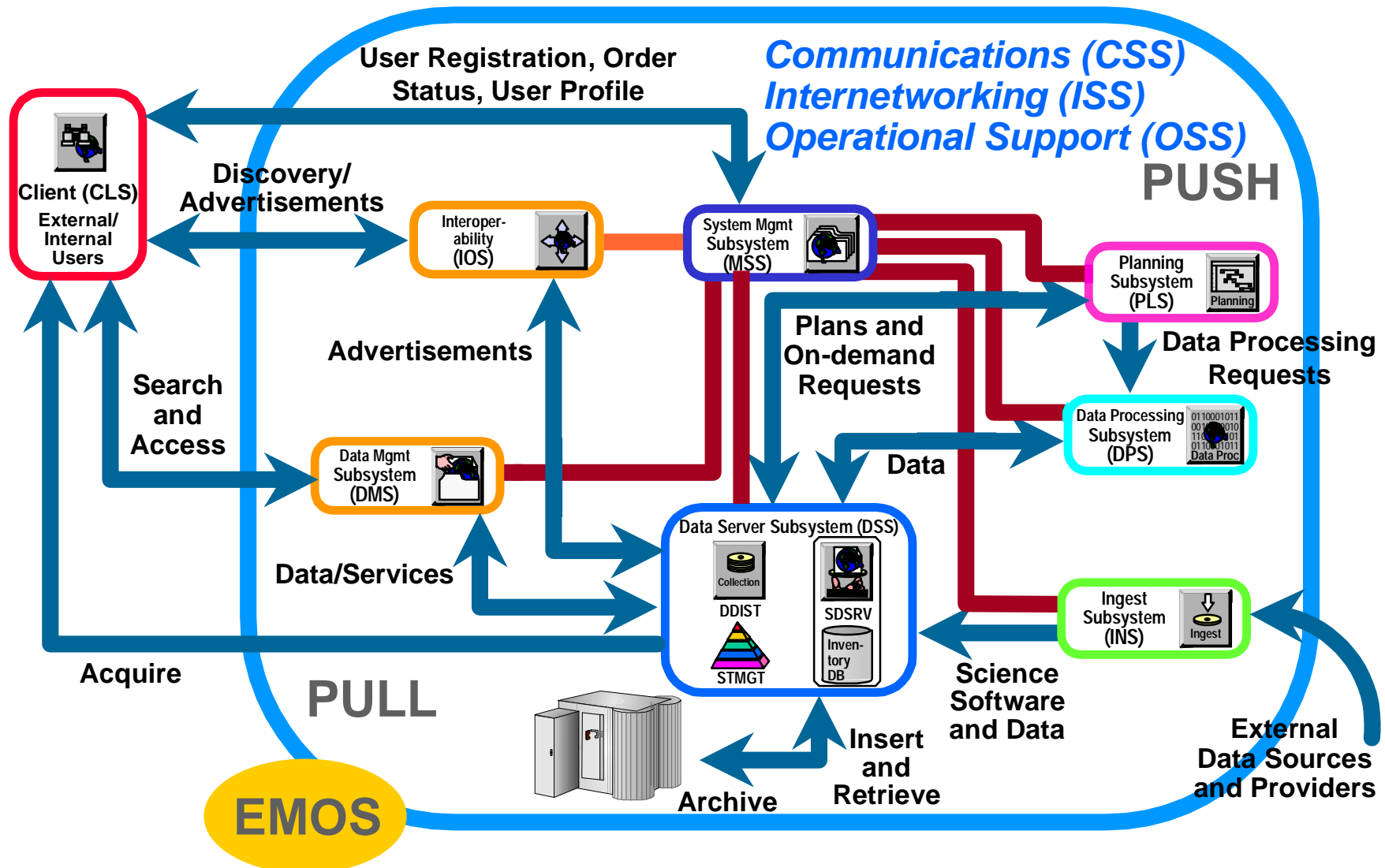
Totally supplied by ECS

Contains ECS components

Relationship of ECS to Global Change Research

WORLDWIDE
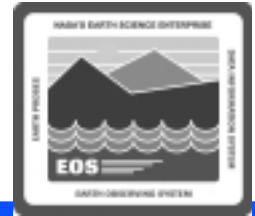GLOBAL CHANGE RESEARCH

USGCRP

Earth Science
Enterprise

EOS

EOSDIS

ECS

ECS Context

User Registration, Order Status, User Profile

Communications (CSS)
Internetworking (ISS)
Operational Support (OSS)

PUSH

Client (CLS) External/ Internal Users

Discovery/ Advertisements

Interoper- ability (IOS)

System Mgmt Subsystem (MSS)

Planning Subsystem (PLS) Planning

Advertisements

Plans and On-demand Requests

Data Processing Requests

Search and Access

Data Mgmt Subsystem (DMS)

Data

Data Processing Subsystem (DPS) Data Proc

Data/Services

Data Server Subsystem (DSS)

Collection
DDIST
STMGT
SDSRV
Inven- tory DB

Ingest Subsystem (INS) Ingest

Acquire

PULL

Science Software and Data

Insert and Retrieve

External Data Sources and Providers

Archive

EMOS

Subsystems and Functions

Science Data Processing Segment (SDPS)

- **Data Server Subsystem (DSS)**
  - Data storage and management: archive science data (with related insert, search and retrieve functions), archive management, data resource staging

- **Ingest Subsystem (INS)**
  - Interface with external data providers and transfer data into ECS (with related staging functions and operator interfaces)

- **Data Processing Subsystem (DPS)**
  - Dispatches and monitors execution of science software

- **Planning Subsystem (PLS)**
  - Long- and short-term planning of science data processing, and management of production resources

Subsystems and Functions (Cont.)
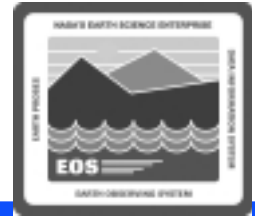
SDPS (Cont.)

- **Client Subsystem (CLS)**
  - Provides interfaces and access for external users

- **Data Management Subsystem (DMS)**
  - Enables cross-site data search and retrieval; gateways for interface of ECS with EOS Data Gateway Web Client (Version 0 IMS) protocol and with ASTER Ground Data System (GDS)

- **Interoperability Subsystem (IOS)**
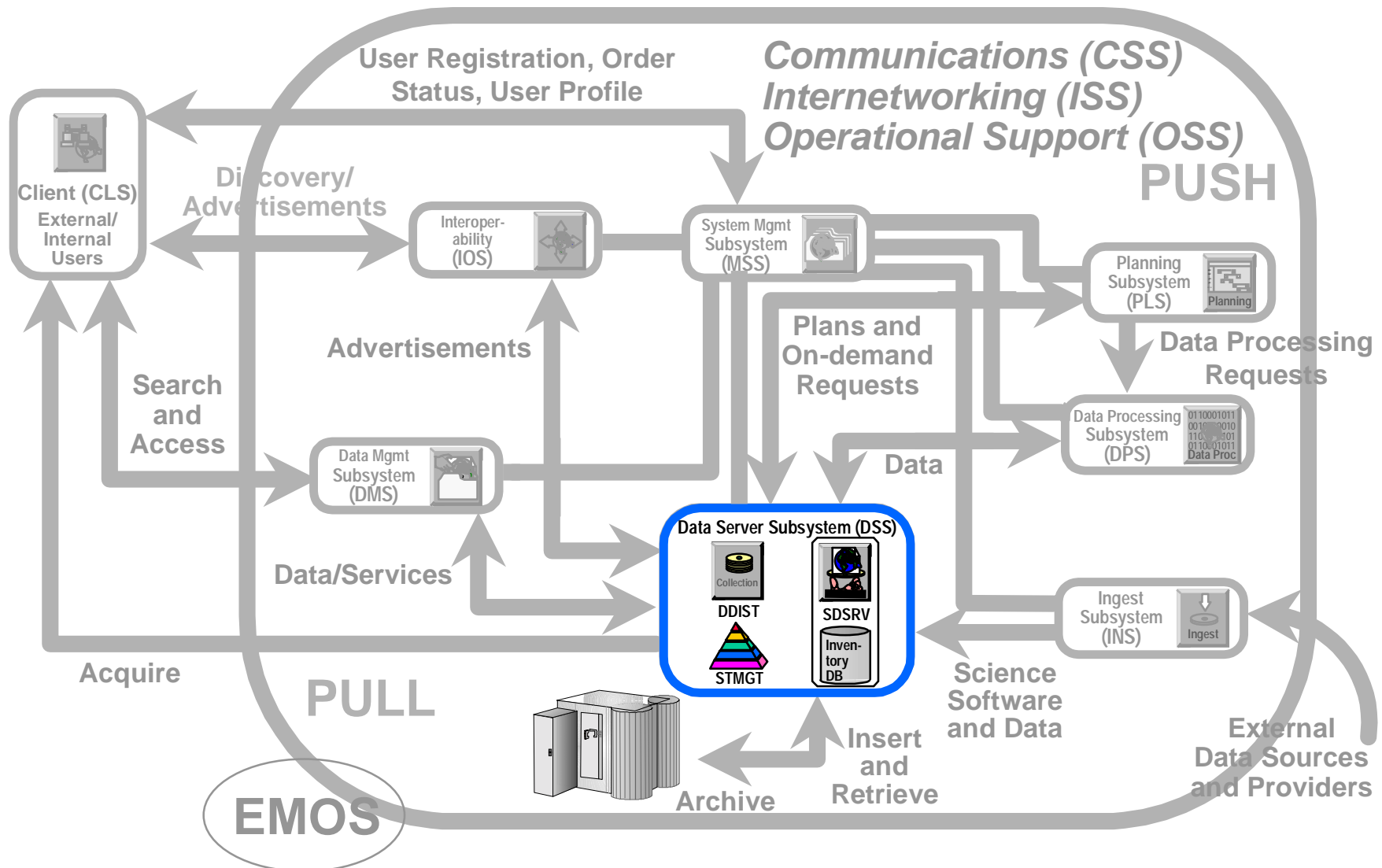 - Advertising Service; support for other subsystems in locating data or DSS services
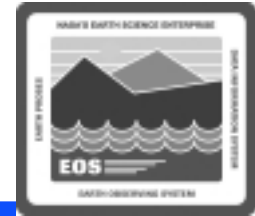
Subsystems and Functions (Cont.)
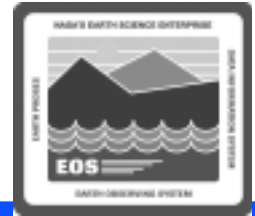
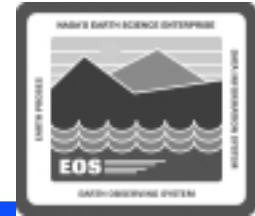## *Communications and System Management Segment (CSMS)*

- **System Management Subsystem (MSS)**
  - System maintenance, management, and administration (includes trouble ticketing, baseline and configuration management, fault and performance monitoring, and user account management and order tracking)

- **Communications Subsystem (CSS)**
  - General system infrastructure functions (includes DCE and network communications, libraries to standardize software mechanisms, application error handling, subscription service, interfaces to e-mail, file transfer and file copy)

- **Internetworking Subsystem (ISS)**
  - Networking hardware devices and embedded software

- **Operational Support Software Subsystem (OSS)**
  - Operating system and related functions

  NOTE: The ISS and OSS are parts of the ECS infrastructure and not addressed in detail in this lesson.
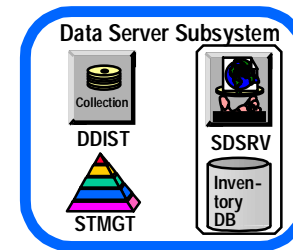
Subsystems and CSCIs: DSS

User Registration, Order
Status, User Profile

Communications (CSS)
Internetworking (ISS)
Operational Support (OSS)

PUSH

Client (CLS)
External/
Internal
Users

Discovery/
Advertisements

Interoper-
ability
(IOS)

System Mgmt
Subsystem
(MSS)

Planning
Subsystem
(PLS)

Advertisements

Plans and
On-demand
Requests

Data Processing
Requests

Search
and
Access

Data Mgmt
Subsystem
(DMS)

Data

Data Processing
Subsystem
(DPS)

Data/Services

Data Server Subsystem (DSS)

Collection

DDIST   SDSRV

STMGT   Inven-
               tory
               DB

Ingest
Subsystem
(INS)

Acquire

PULL

Science
Software
and Data

External
Data Sources
and Providers

EMOS

Archive

Insert
and
Retrieve

Subsystems and CSCIs: DSS (Cont.)

- **Data Server Subsystem (DSS)**
  - **Provides capabilities to store, search, retrieve, and distribute earth science and related data**
  - **Client-server information transfer is by commands and requests**
  - **Generates Universal References to identify ECS entities**
   - **Granule UR: represents a granule in the data server (e.g., as follows)**

UR:10:DsShESDTUR:UR:15:DsShSciServerUR:13:[GSF:DSSDSRV]:16:SC:MOD10_L2:1411

  - **Server UR: represents a specific running data server application (e.g., DsShSciServerUR)**
  - **Uses MSS Event services to log system-level events**
  - **Interfaces with virtually all ECS subsystems and components**
  - **Uses several COTS tools: RogueWave tools and libraries, Sybase relational database, Spatial Query Server**

Data Server Subsystem

Collection
DDIST
STMGT
SDSRV
Inventory DB

A granule is the smallest piece of data that is independently managed by the system, i.e., represented by a record in the inventory.
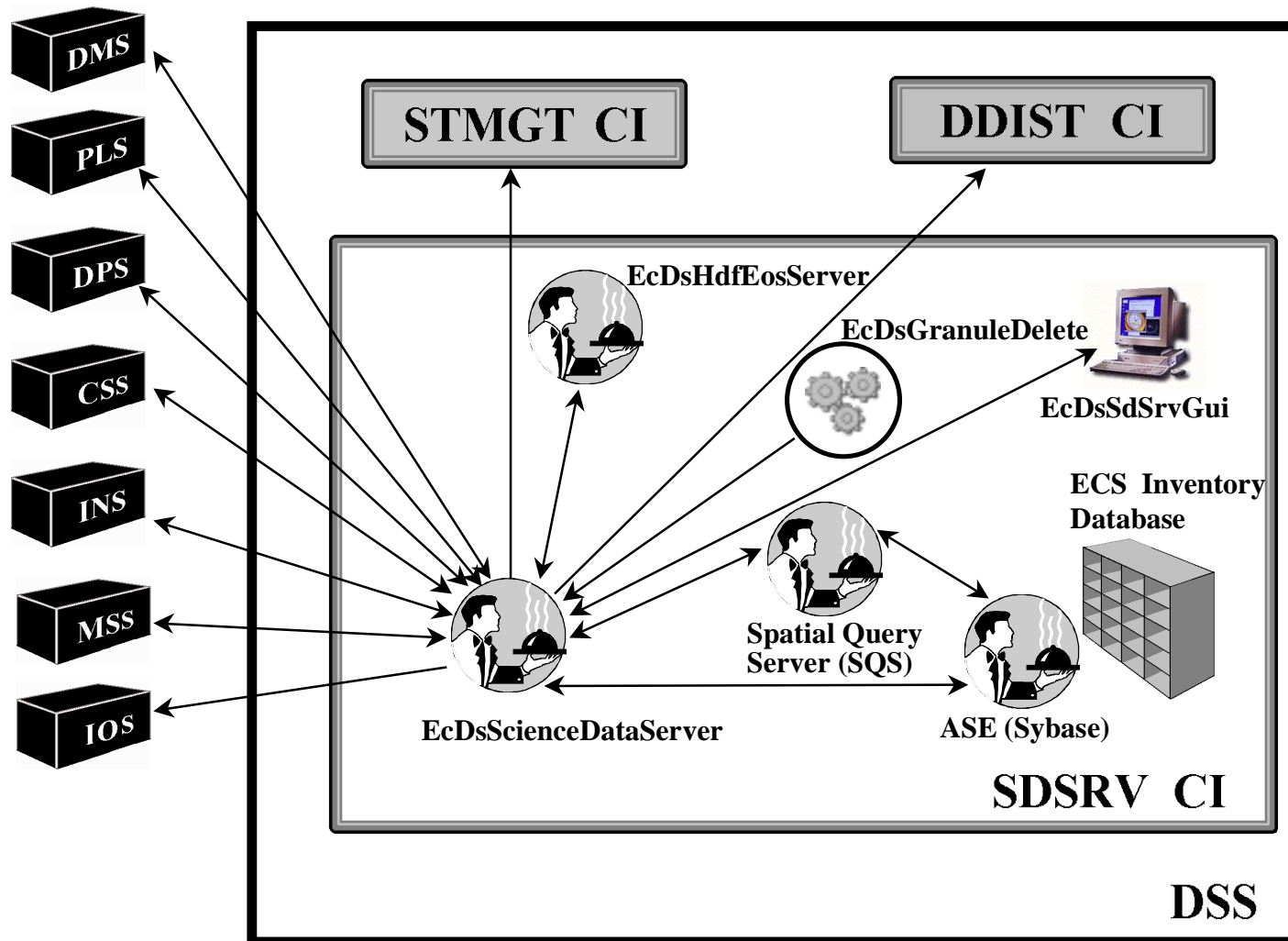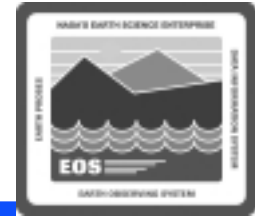
Subsystems and CSCIs: DSS (Cont.)
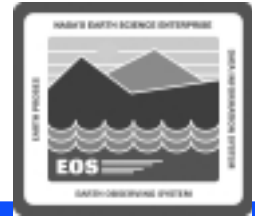
- **Science Data Server (SDSRV) CSCI**

    - **Provides the ECS with a catalog of Earth Science Data holdings, and the Earth Science Data Type (ESDT) services that operate on the data**

    - **Manages and provides user access to data collections through its catalog of metadata and mechanisms to acquire data from the archive**

    - **Six major components**

        - **Science Data Server** - services requests for storage, search, retrieval, and manipulation of science data

        - **HDF EOS Server** - provides science data subsetting

        - **Science Data Server GUI** - provides operator interface

        - **Granule Deletion Administration Tool** - provides a command-line interface for deleting granules

        - **Sybase ASE Server** - manages catalog (metadata)

        - **SQS Server** - manages catalog (specialized spatial searches)

Subsystems and CSCIs: DSS (Cont.)
SDSRV Architecture and Interfaces

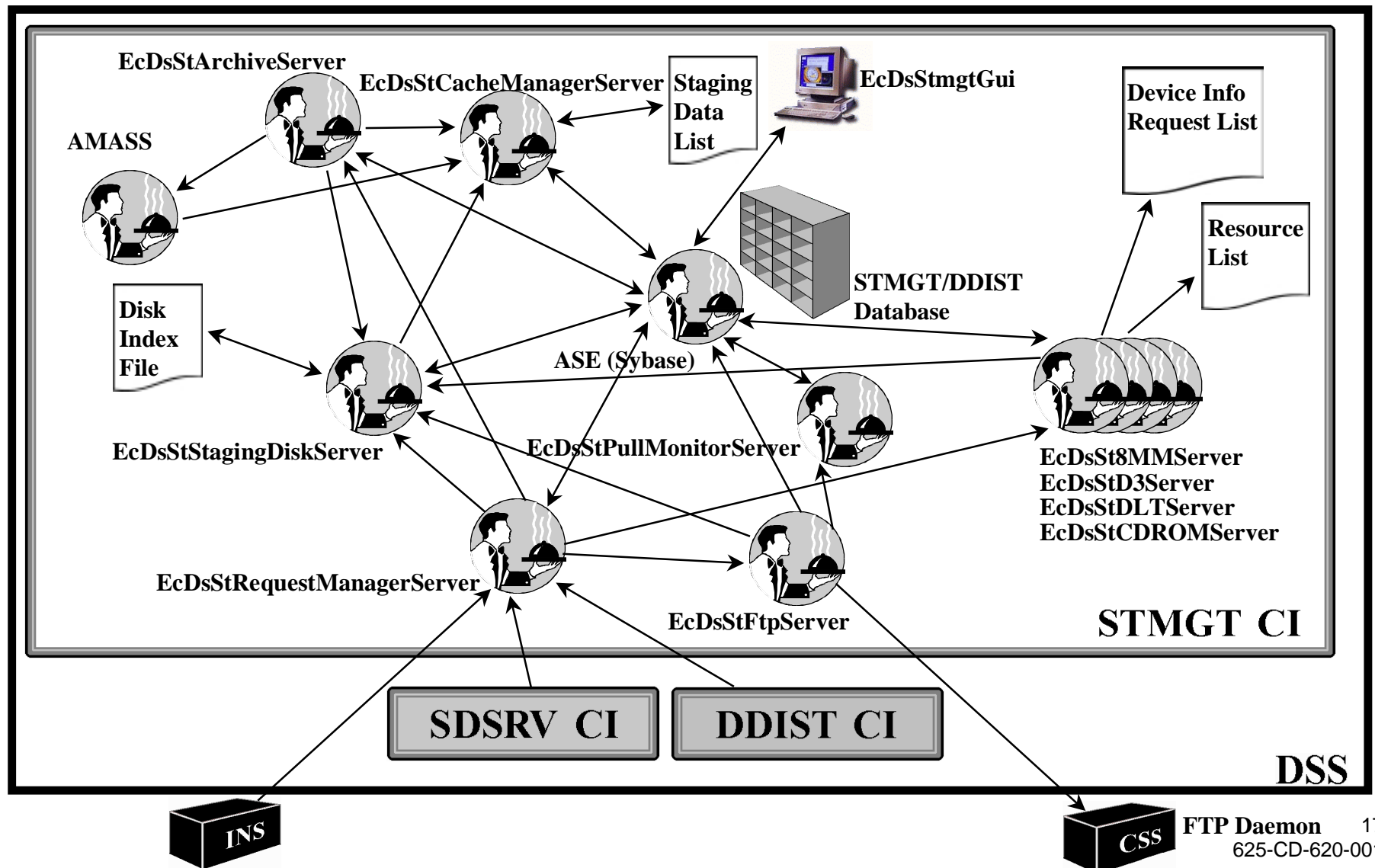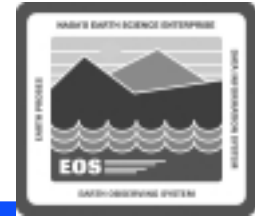# Subsystems and CSCIs: DSS (Cont.)
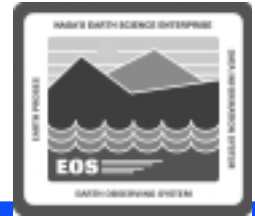
- **Storage Management (STMGT) CSCI**
  - **Stores, manages, and retrieves data files on behalf of other science data processing components**
  - **Six major components**
    - **Archive Server** - provides GUI and access to stored data
    - **Cache/Staging Manager** - Cache Manager server and Staging Disk server manage data files that have been retrieved from the archive and placed into a cache area on staging disk
    - **Media Server Process** - schedules access to shared peripheral devices/resources (8mm, D3, DLT, CDROM, FTP)
    - **Pull Monitor** - links to Cache Manager to manage files in the user pull area, deleting them as they are retrieved by users or as their time-out periods expire
    - **Request Manager** - routes requests from clients to servers
    - **Data Base** - contains data tables for STMGT devices, cache management, event and log management, requests, and related functions

Subsystems and CSCIs: DSS (Cont.) STMGT Architecture and Interfaces
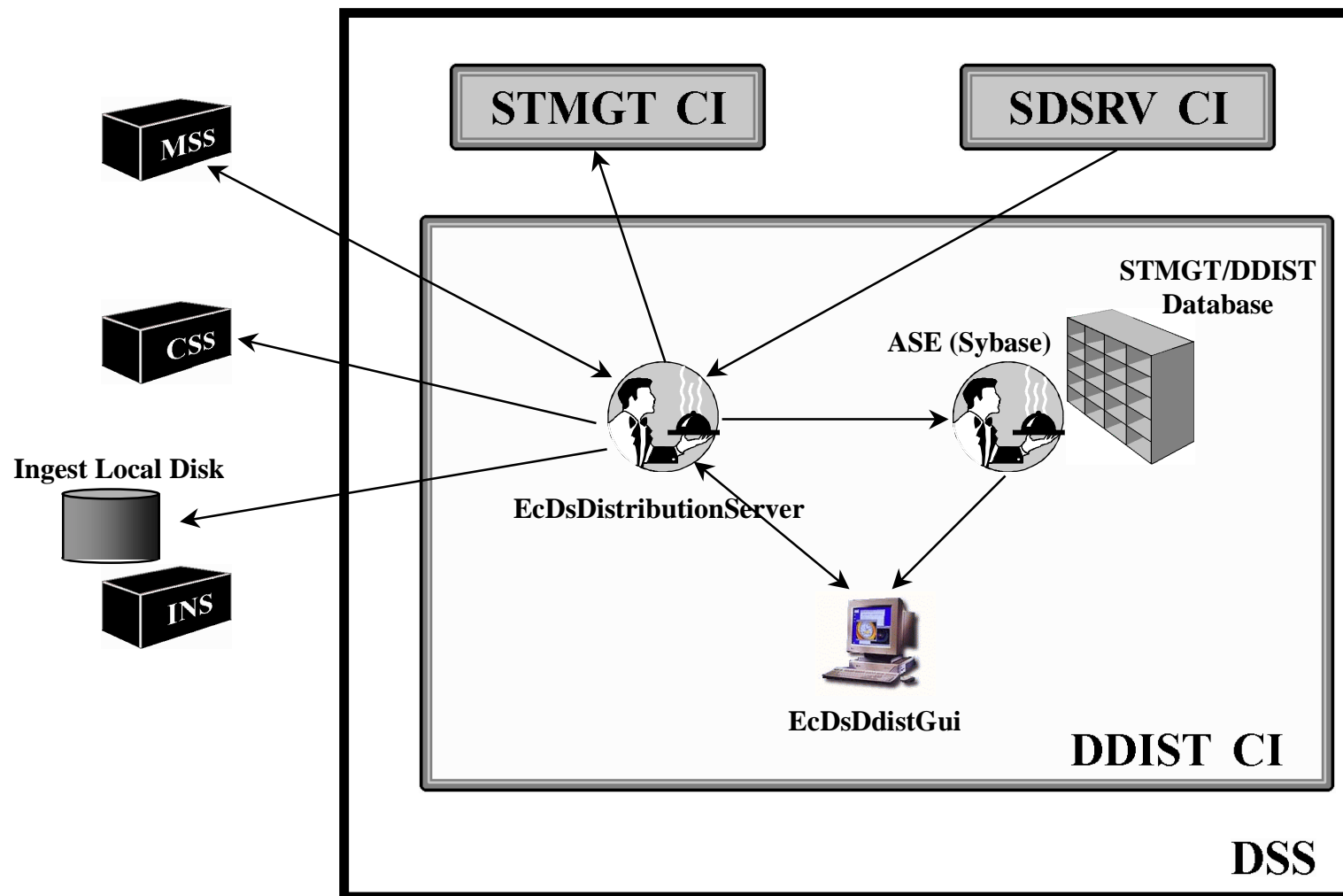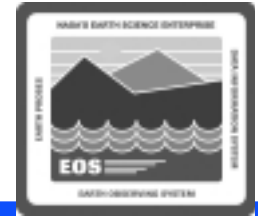
Subsystems and CSCIs: DSS (Cont.)
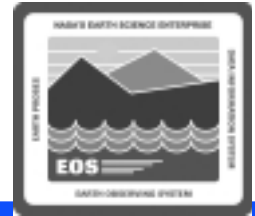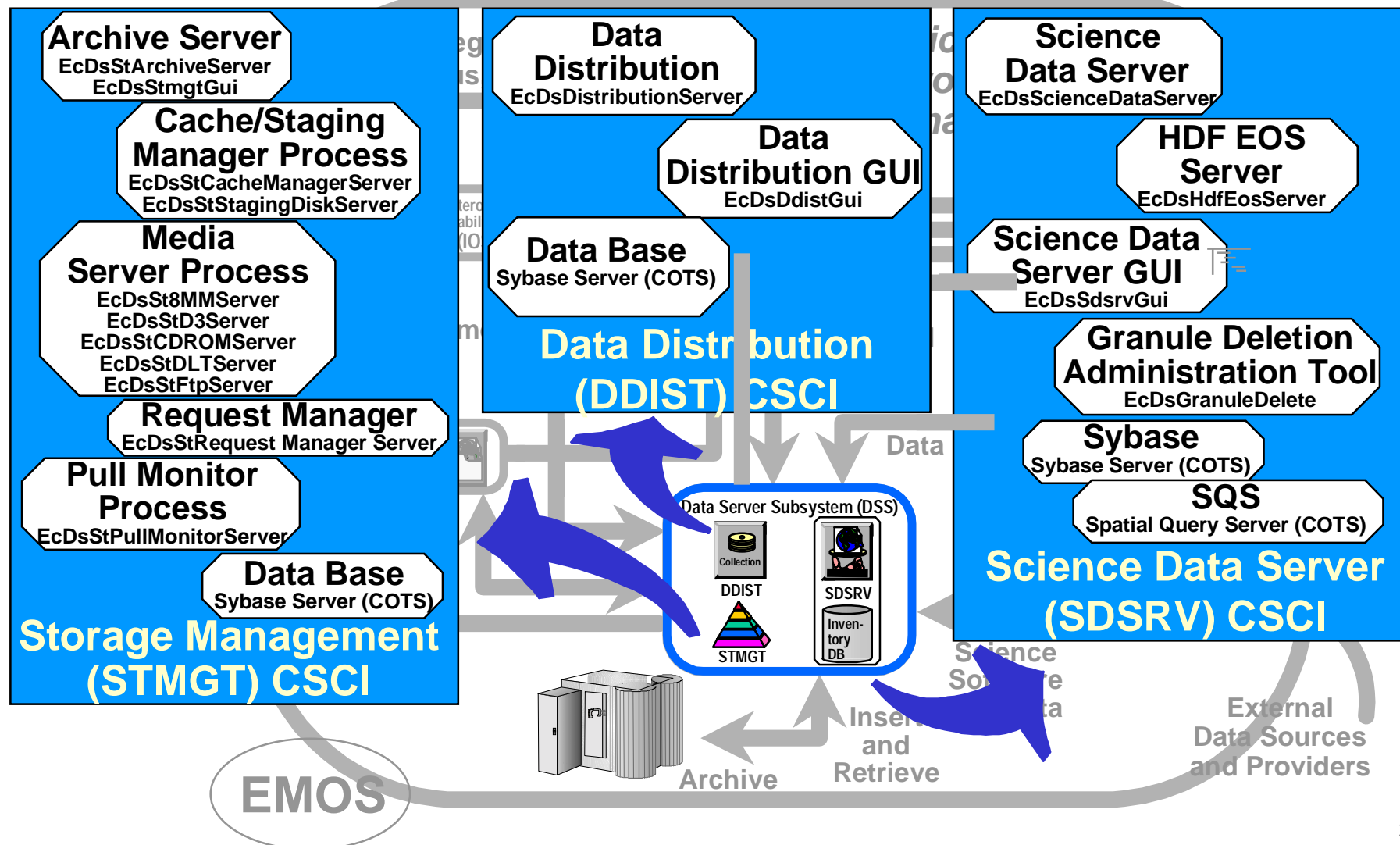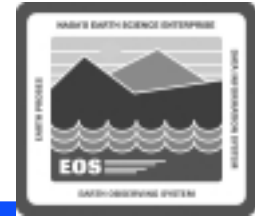
- **Data Distribution (DDIST) CSCI**
  - Monitors and controls processing of requests for internal and external distributions, either electronically or on physical media (8mm tape, D3 tape, CD-ROM, Digital Linear Tape)
  - Directs STMGT to place data in working storage, to copy data to media, or to push data as required via FTP
  - Sends e-mail notifications
  - Three major components
    - Data Distribution Server - provides control and coordination for data distribution through request processing
    - Data Distribution GUI - allows operations staff to initiate, track, and manipulate distribution requests
    - Data Base - contains the request list; updates and provides the request configuration
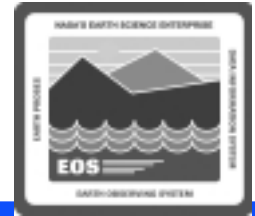
Subsystems and CSCIs: DSS (Cont.)
DDIST Architecture and Interfaces

Subsystems and CSCIs: DSS (Cont.)

Storage Management (STMGT) CSCI

Archive Server
EcDsStArchiveServer
EcDsStmgtGui

Cache/Staging Manager Process
EcDsStCacheManagerServer
EcDsStStagingDiskServer

Media Server Process
EcDsSt8MMServer
EcDsStD3Server
EcDsStCDROMServer
EcDsStDLTServer
EcDsStFtpServer

Request Manager
EcDsStRequest Manager Server

Pull Monitor Process
EcDsStPullMonitorServer

Data Base
Sybase Server (COTS)

Data Distribution (DDIST) CSCI

Data Distribution
EcDsDistributionServer

Data Distribution GUI
EcDsDdistGui

Data Base
Sybase Server (COTS)

Science Data Server (SDSRV) CSCI

Science Data Server
EcDsScienceDataServer

HDF EOS Server
EcDsHdfEosServer

Science Data Server GUI
EcDsSdsrvGui

Granule Deletion Administration Tool
EcDsGranuleDelete

Sybase
Sybase Server (COTS)

SQS
Spatial Query Server (COTS)

Data Server Subsystem (DSS)

Collection
DDIST
STMGT
SDSRV
Inventory DB

Data

Science Source Data

Insert and Retrieve

Archive

External Data Sources and Providers

EMOS

Subsystems and CSCIs: INS

- **Ingest Subsystem (INS)**
  - Transfer of data into ECS (SDPS repositories) in accordance with approved ICDs
  - Supports varied data formats and structures
  - *Ingest Client*: A set of ingest software configured for requirements of a specific situation
  - Ingest clients perform data preprocessing, metadata extraction, and metadata validation on incoming data
  - Data staged to one of two areas
    - Level 0 (L0) data from ongoing missions, and EDOS ancillary data, staged to INS working storage area
    - Non-L0 data (e.g., non-EDOS ancillary data, L1A-L4 data) staged directly to DSS working storage area
  - Uses several COTS tools: RogueWave class libraries, Sybase relational database, Tivoli Client, DCE Client, DCE Driver, MSAccess

Subsystems and CSCIs: INS (Cont.)
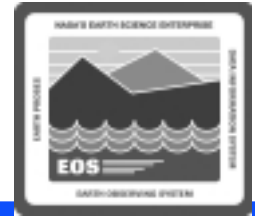
- **Ingest (INGST) CSCI**
  - **Acquires data by various methods and transfers the data into ECS**
    - **Automated transfer: in response to notification from the data provider, Ingest transfers the data from a specified network location**
    - **Polling: transfer of data from predetermined network locations which Ingest periodically checks for new data**
      - **With Delivery Record**
      - **Without Delivery Record**
    - **Media: reading data from physical media; uses GUI**
    - **Cross-Mode Ingest: E-mail distribution notification used to create a Delivery Record File for Polling with Delivery Record**
  - **Stores and manages request information**
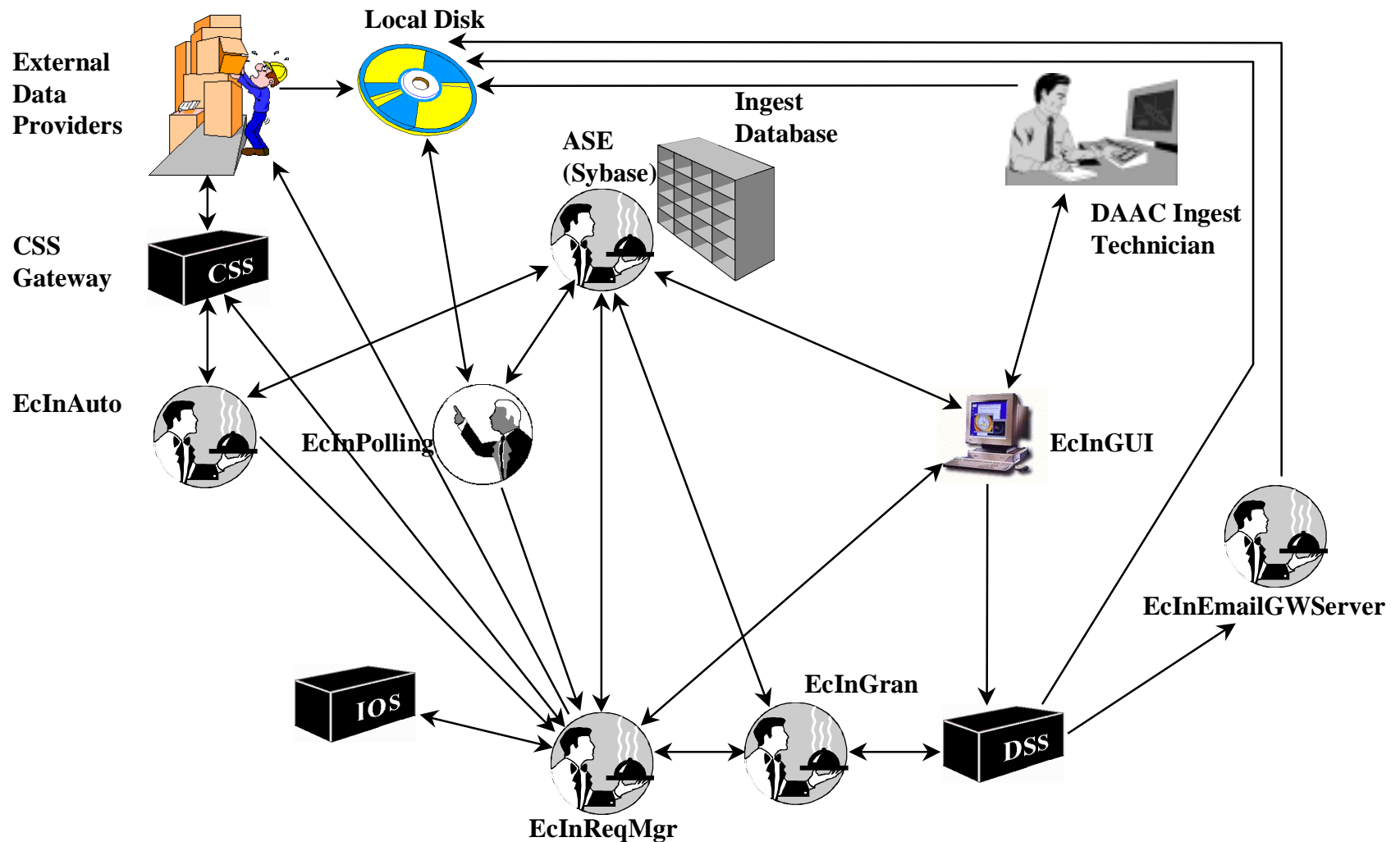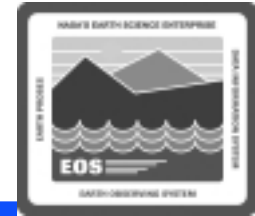 - **Provides for data preprocessing and insertion**
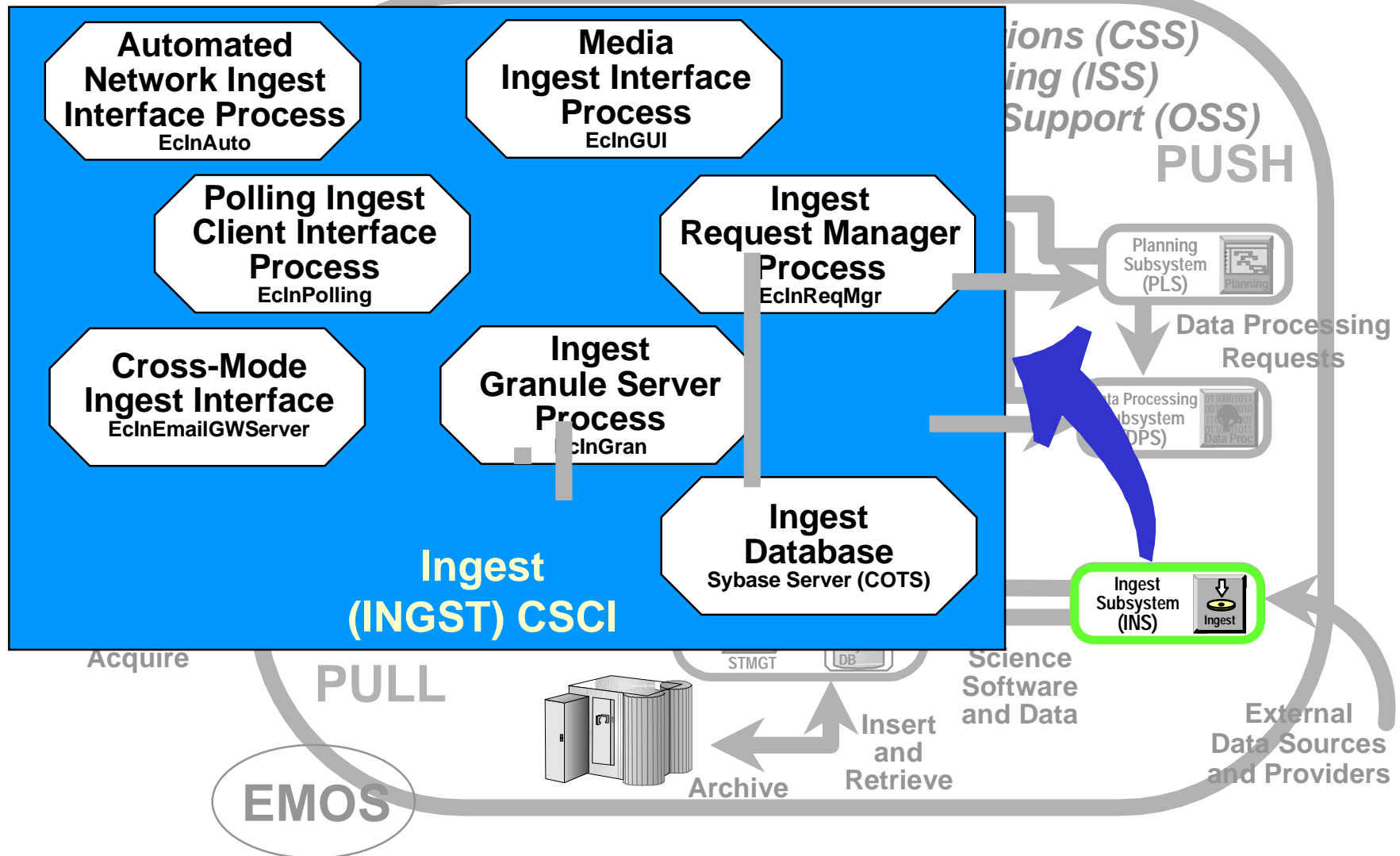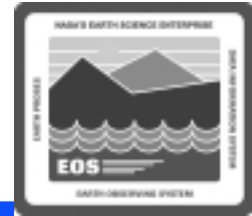
Subsystems and CSCIs: INS (Cont.)
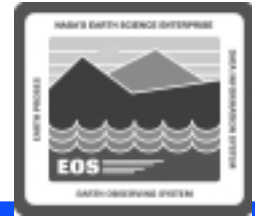
- **Ingest (INGST) CSCI (Cont.)**
  - **Seven major components**
    - **Automated Network Ingest Interface** - provides basic capability to ingest data electronically from an external source
    - **Polling Ingest Client Interface** - creates polling request, detects new files in a specified external location, creates and submits ingest request
    - **Media Ingest Interface** - provides operators ability to perform ingest from physical media
    - **Cross-Mode Ingest Interface** - provides an E-mail gateway server to receive E-mail distribution notifications and store them as files in a location for polling with delivery record
    - **Ingest Request Manager** - manages ingest request traffic and processing
    - **Ingest Granule Server** - provides services for required preprocessing of data and subsequent insertion into Data Server
    - **Ingest Database** - stores and provides access to Ingest Subsystem internal data (e.g., Request Status, History Logs)
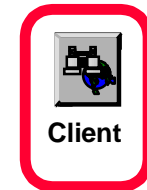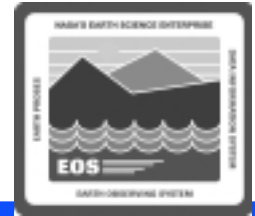
Subsystems and CSCIs: INS (Cont.)

Automated Network Ingest Interface Process
EcInAuto

Media Ingest Interface Process
EcInGUI

Polling Ingest Client Interface Process
EcInPolling

Ingest Request Manager Process
EcInReqMgr

Cross-Mode Ingest Interface
EcInEmailGWServer

Ingest Granule Server Process
EcInGran

Ingest Database
Sybase Server (COTS)

Ingest (INGST) CSCI

ions (CSS)
ing (ISS)
Support (OSS)

PUSH

Planning Subsystem (PLS)

Data Processing Requests

Data Processing Subsystem (DPS)

Ingest Subsystem (INS)

Acquire

PULL

EMOS

STMGT

DB

Insert and Retrieve

Archive

Science Software and Data

External Data Sources and Providers

Subsystems and CSCIs: CLS

- **Client Subsystem (CLS)**
  - **User access to ECS services for ASTER**
    - **Permits Data Acquisition Request to task ASTER instrument**
    - **Permits request of ASTER On-demand Products**
  - **Provides user authentication and User Profile information to the Search and Order tool**
    - **Search and retrieval of data are performed by the EOS Data Gateway (Version 0 Web Client)**
  - **Includes applications programs accessible through user interfaces**
    - **EOSView**
    - **ASTER Data Acquisition Request (DAR) Tool**
    - **On-Demand Form Request Manager (ODFRM)**
  - **Uses several COTS tools: Netscape Navigator, Netscape Enterprise Server, XVT (widget set and development tool for EOSView), Interactive Data Language (IDL) (used in EOSView visualization features), and DCE Client**
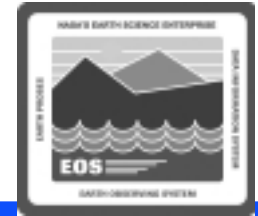
Client

Subsystems and CSCIs: CLS (Cont.)
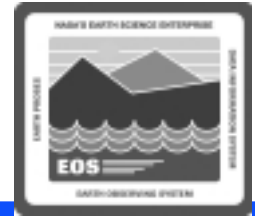
- **Workbench (WKBCH) CSCI**
  - **Includes a set of application programs that implement functions of the CLS science user interface**
  - **Release 6 Workbench includes 2 tools**
    - **EOSView (X/Motif-based)**
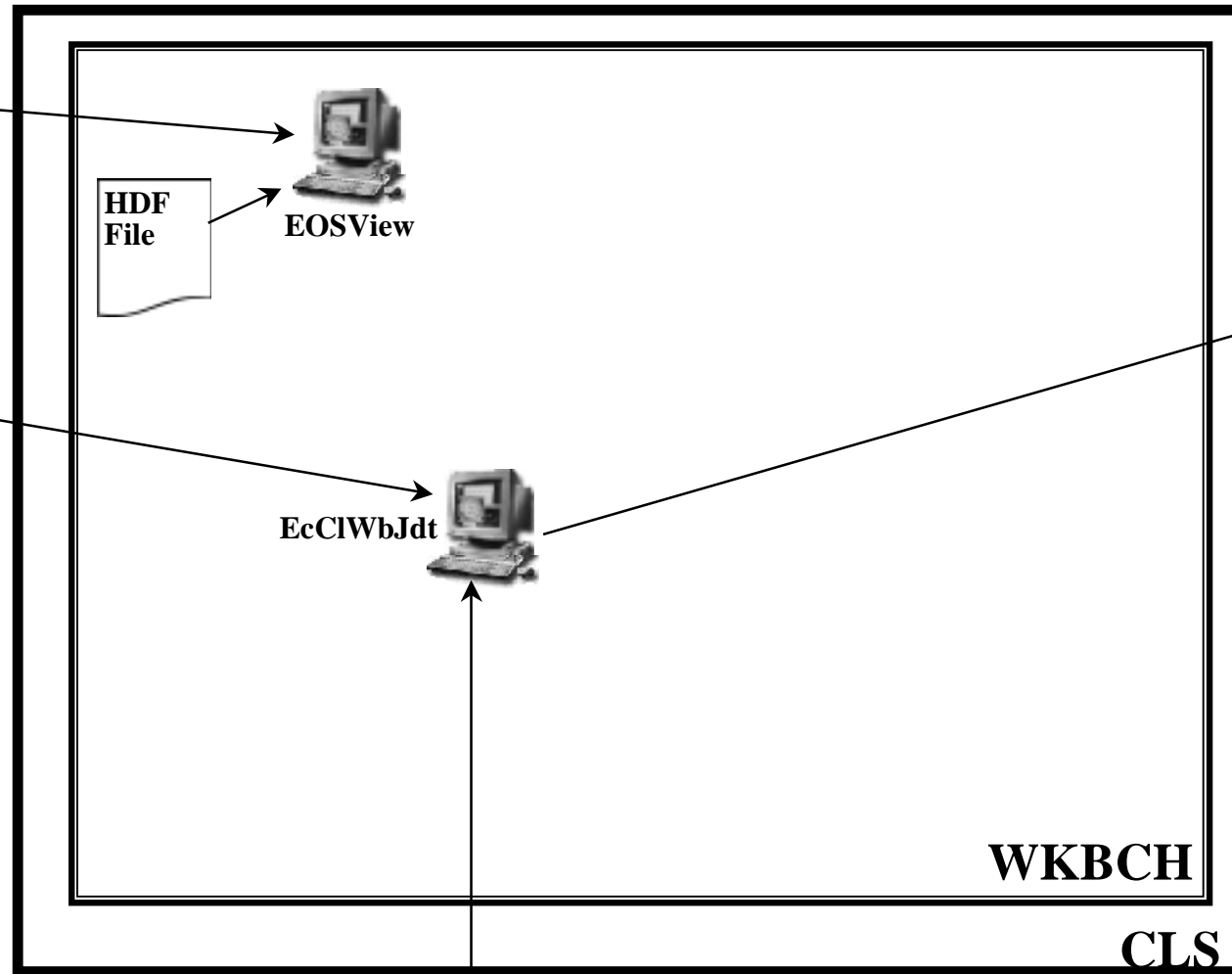   - **ASTER DAR Tool (Java/HTML-based)**

Subsystems and CSCIs: CLS (Cont.)
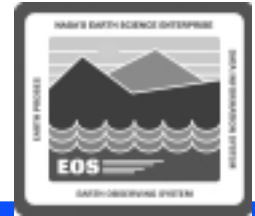# WKBCH Architecture and Interfaces

Science/DAAC User

HDF File

EOSView

Web Browser

EcClWbJdt

MSS

WKBCH

CLS

CSS

Subsystems and CSCIs: CLS (Cont.)

- **Desktop (DESKT) CSCI**
  - Provides a gateway server for communication with MSS User Registration Server to support seamless user registration through the EOS Data Gateway (EDG) web client and to obtain or update user profile information
  - User Profile Gateway - provides user profile information to the EDG for ECS users
    - User authentication
    - Submit/Update user information in profile

Subsystems and CSCIs: CLS (Cont.)
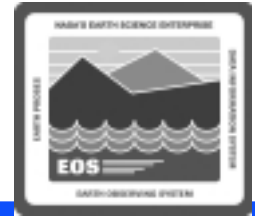# DESKT Architecture and Interfaces

Science/DAAC User

Web Browser

User Profile File (profile.odl)

V0 IMS

EOS DATA GATEWAY

(Design controlled under separate contract)

DMS

MSS

EcClDtUserProfileGateway

DESKT

CLS
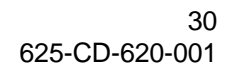
Subsystems and CSCIs: CLS (Cont.)

- **On-Demand Form Request Manager (ODFRM) CSCI**
  - **ODFRM HTML pages and Common Gateway Interface (CGI) programs**
  - **User creates on-demand processing request and submits it to the Planning Subsystem (PLS)**
  - **ASTER on-demand products**
    - **ASTER L1B***
    - **ASTER DEM (Digital Elevation Model)***
    - **ASTER higher-level products (AST_04, AST_05, AST_06V, AST_06T, AST_06S, AST_07S, AST_07V, AST_09T, AST_09V, AST_09S, AST_08)**

  * Note: Requires special privilege (in User Profile) to use ODFRM to order this product

Subsystems and CSCIs: CLS (Cont.)
ODFRM Architecture and Interfaces

Web Browser

ECS Users

ODFRM

Netscape Enterprise Server

EcClOdRequest (CGI Program)

MSS

PLS

ODFRM

CLS

Subsystems and CSCIs: CLS (Cont.)

User Profile Gateway
EcClDtUserProfileGateway

Desktop (DESKT) CSCI

Client (CLS)
External/ Internal Users

HTML User Interface
ODFRM

CGI Programs
EcClOdRequest

HDF Product Viewing Tool
EOSView

ASTER DAR Tool
EcClWbJdt

On-Demand Form Request Manager (ODFRM) CSCI

Workbench (WKBCH) CSCI
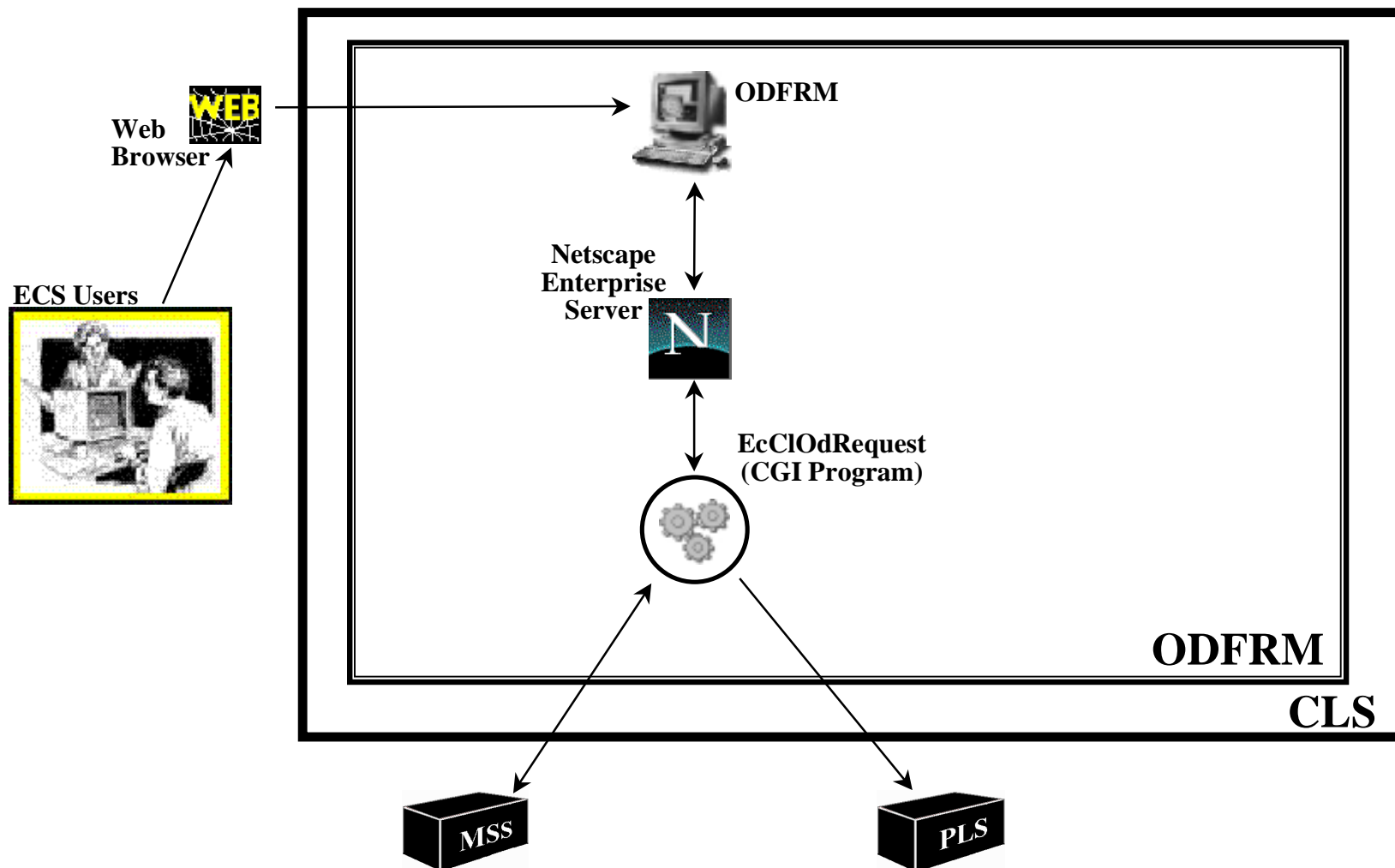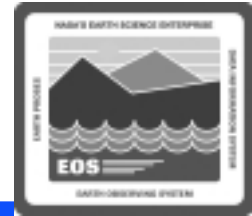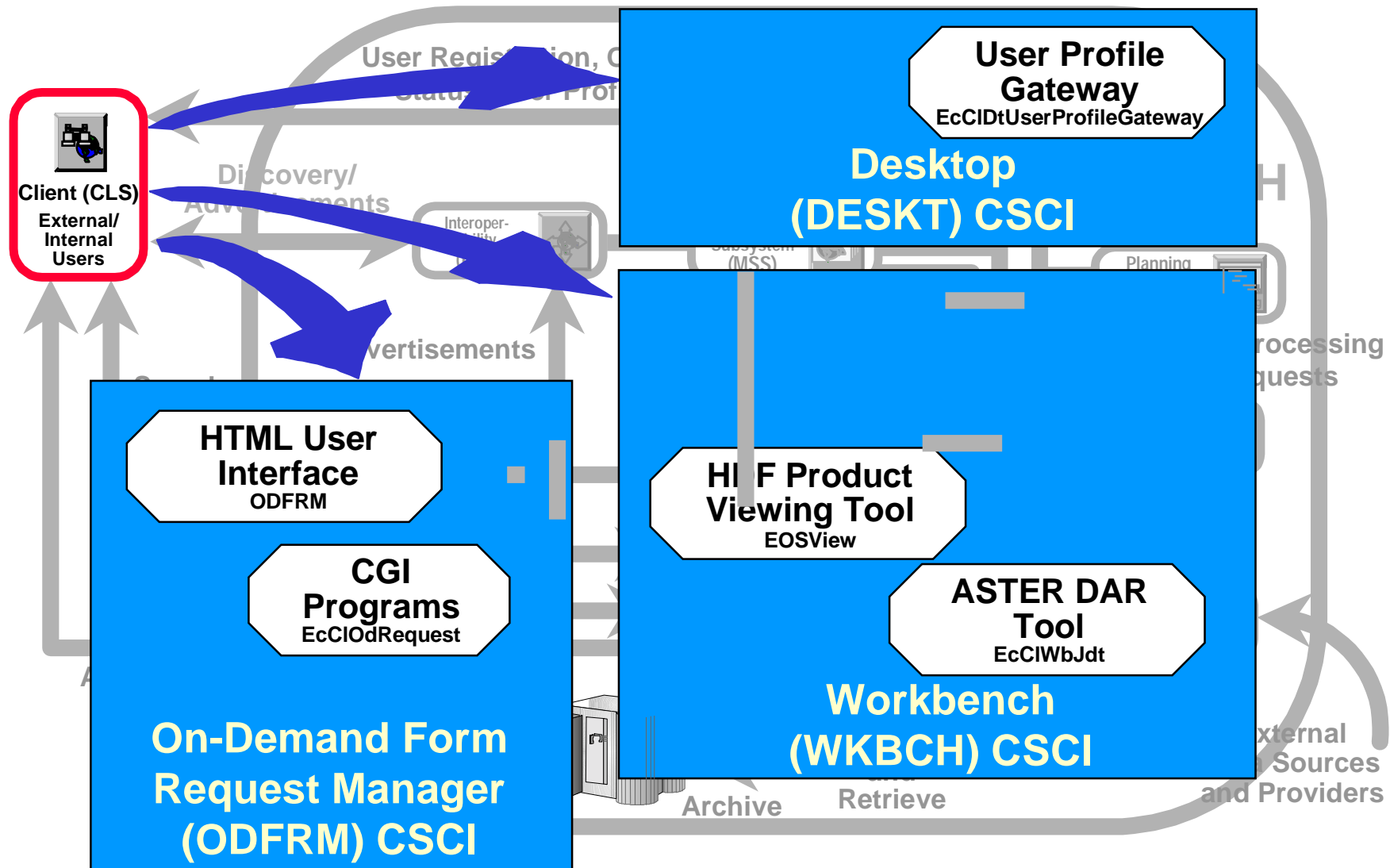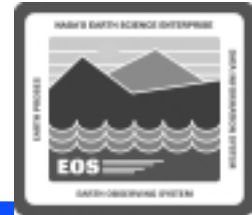
Subsystems and CSCIs: DMS
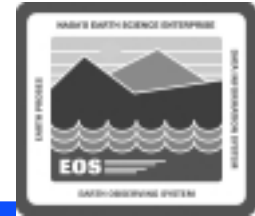
- **Data Management Subsystem (DMS)** `Data Mgmt Subsystem`
  - **Provides one-way catalog interoperability between ECS and the V0 Information Management System (IMS) and two-way catalog interoperability between ECS and the ASTER Ground Data System (GDS)**
  - **Supplies gateway processes to translate requests between V0 or ASTER protocols and ECS**
  - **Maintains a Data Dictionary that stores ECS data collection information (i.e., collection metadata, attributes, valid keywords) and mappings between this information and V0 or the ASTER Ground Data System (GDS) to permit translation of requests between the systems**
  - **Uses several COTS tools: RogueWave class libraries, Builder Xcessory (GUI builder tool), Sybase ASE Server (for Data Dictionary database search and update), and DCE client**

Subsystems and CSCIs: DMS (Cont.)
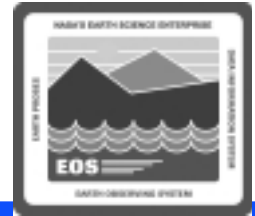
- **Data Dictionary (DDICT) CSCI**
    - **Manages definitions of data collections including metadata, data domains (valid values), and data location**
    - **Stored in a relational Database Management System (DBMS)**
    - **Three major components**
        - **Data Dictionary Server - provides DDICT client processes the ability to perform data searches, inserts, updates, or deletes to the DDICT database**
        - **Data Dictionary Maintenance Tool - provides a GUI to insert, update, or delete schema information held in the DDICT database, and allows operations staff to modify database attributes (e.g., valids, mapping)**
        - **Data Dictionary ASE Server - COTS database server**

Subsystems and CSCIs: DMS (Cont.) DDICT Architecture and Interfaces

V0 IMS

EOS DATA GATEWAY

ASTER GDS

GDS

DSS

CSS

MSS

EcDmDdMaintenanceTool

EcDmDictServer

EcDmDictService Database

ASE (Sybase)

DDICT

V0 GTWY CSCI   AST GTWY CSCI

DMS
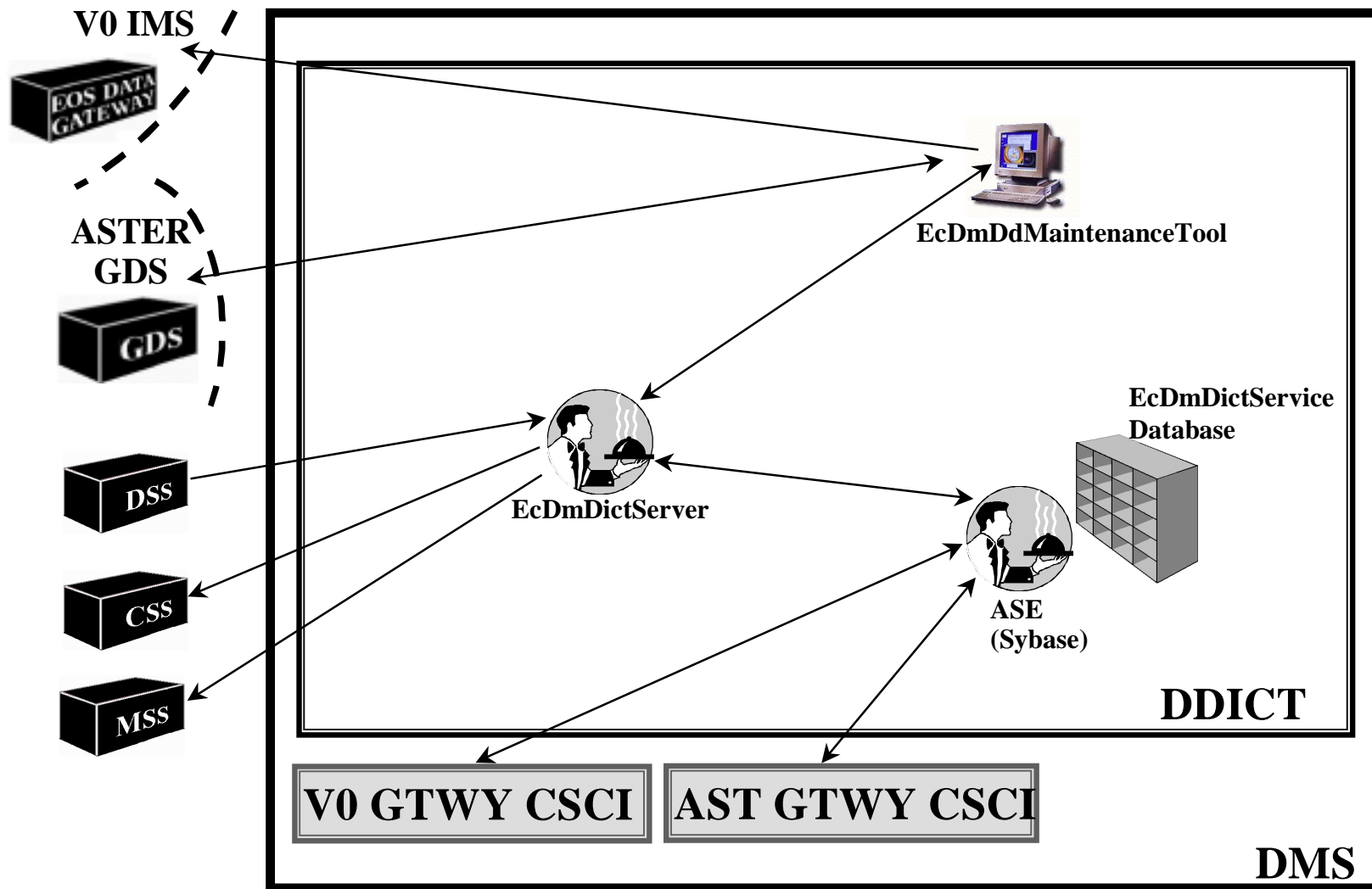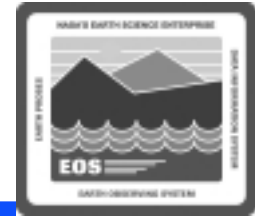
Subsystems and CSCIs: DMS (Cont.)
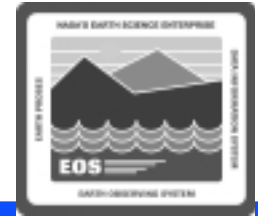
- **Version Zero Gateway (V0 GTWY) CSCI**
  - Provides one-way interoperability with the V0 Information Management System (IMS) for inventory searches, browse requests, product orders, and price estimate requests
  - At EDC, transmits Landsat 7 product requests to the V0 IMS to allow billing by the billing and accounting system
    - Distributed Ordering, Reporting, Researching, and Accounting Network (DORRAN)
  - Queries between V0 IMS and the ECS V0 GTWY use the Object Description Language (ODL) format
  - One component
    - **V0 to ECS Gateway Server** - allows use of the EOS Data Gateway Web Client to search and request data and services defined within ECS

Subsystems and CSCIs: DMS (Cont.)
V0 GTWY Architecture and Interfaces

AST GTWY CSCI

CSS

MSS

V0 IMS

DORRAN

EOS DATA GATEWAY

LPDS

DSS

EcDmV0ToEcsGateway

V0 GTWY

DDICT CSCI

DMS
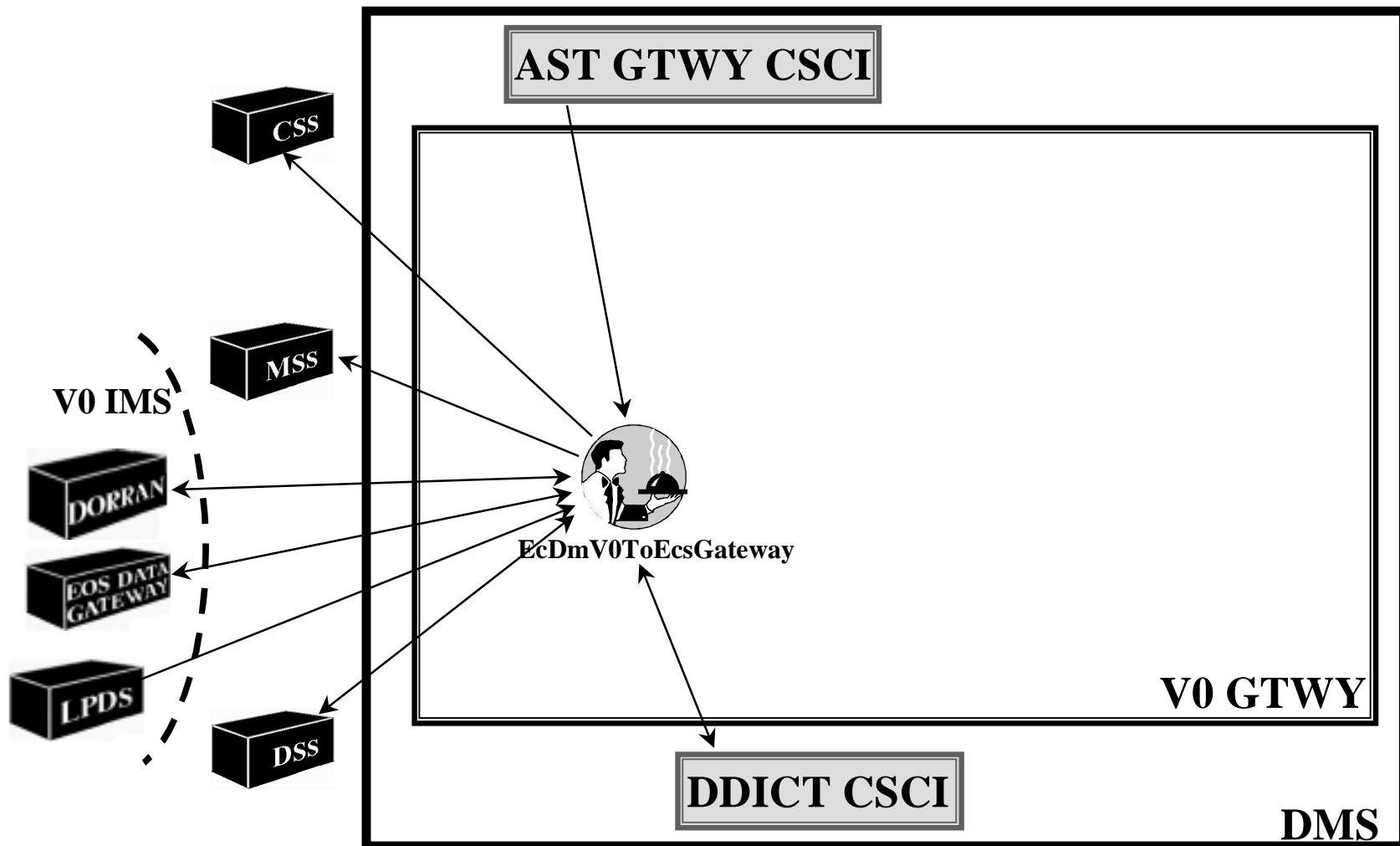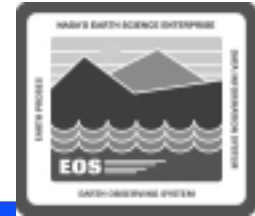
Subsystems and CSCIs: DMS (Cont.)
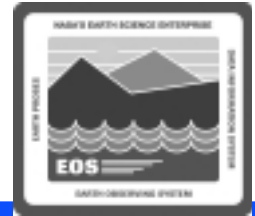
- **ASTER Gateway (AST GTWY) CSCI**
  - Provides two-way interoperability with the ASTER GDS for inventory searches, browse requests, product orders, and price estimate requests
  - Two components
    - **ASTER to ECS Gateway Server** - receives and translates ODL format requests from ASTER GDS for science data search, browse, product acquires, price estimates, and status; located at SMC
    - **ECS to ASTER Gateway Server** - receives search, browse, acquire requests for science data from the EOS Data Gateway (in ODL format) and from the Planning subsystem On-demand Request Manager (in ECS format), translates them into ASTER GDS ODL format, and sends them to the ASTER GDS; translates results received from ASTER GDS back into the requestor's format and forwards them; located at EDC

Subsystems and CSCIs: DMS (Cont.)
AST GTWY Architecture and Interfaces

V0 IMS

EOS DATA GATEWAY

V0 GTWY CSCI

EcDmAsEcsToAsterGateway

PLS

ASTER
GDS

MSS

GDS

EcDmAsAsterToEcsGateway

CSS

SMC

AST GTWY

DDICT CSCI

DMS

Subsystems and CSCIs: DMS (Cont.)

User Registration, Order
Status, User Profile

Client (CLS)
External/
Internal
Users

Discovery/
Advertisements

Interoper-
ability
(IOS)

System M
Subsyst
(MSS

Advertisements

Search
and
Access

**Data Mgmt
Subsystem
(DMS)**

Data Server Subsystem (DSS)

**Data Dictionary
Server**
EcDmDictServer

**Data Dictionary
Maintenance Tool**
EcDmMaintTool

**Data Dictionary
ASE Server**
Sybase Server (COTS)

**Data Dictionary
(DDICT) CSCI**

**V0 to ECS
Gateway Server**
EcDmV0ToECSGateway

**Version Zero Gateway
(V0 GTWY) CSCI**

**ASTER to ECS
Gateway Server**
EcDmAsAsterToECSGateway

**ECS to ASTER
Gateway Server**
EcDmAsECSToAsterGateway

al
rces
ders

**ASTER Gateway
(AST GTWY) CSCI**

Subsystems and CSCIs: IOS

- **Interoperability Subsystem (IOS)**
  - **Maintains directories of Universal References (URs)**
  - **Maintains directories of ECS products and services**
  - **Provides the Advertising Service that permits browsing, searching, and retrieving information about ECS holdings**
    - **Product advertisements: collection-level metadata**
    - **Service advertisements: for "signature services" (e.g., acquire) and Subscription Server events [Signature Services related to an ESDT identify a signature, or set of required identifiers, and a server UR needed to retrieve granule data]**
  - **Uses several COTS tools: RogueWave class libraries, Sybase ASE Server (for Advertising Service database search and update)**

Subsystems and CSCIs: IOS (Cont.)
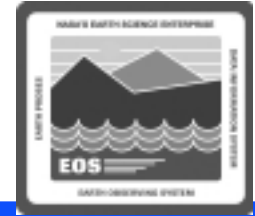
- **Advertising Service (ADSRV) CSCI**
  - **Manages Earth Science related advertisements**
  - **Advertising data stored in a relational Database Management System (DBMS)**
  - **Consists of two components**
    - **Advertising Server: a background process that interacts with the DBMS for searching, inserting, and updating advertisements**
    - **Earth Science Online Directory (ESOD): a combination of HTML web pages and Common Gateway Interface (CGI) programs called from the HTML web pages to communicate with the Advertising Server and other ECS subsystems; permits users to search for advertisements**

Subsystems and CSCIs: IOS (Cont.)
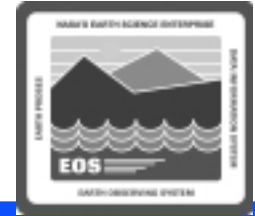
- **Advertising Server Component**
  - **Two main processes**
    - **Advertising Server** - provides clients with ability to search, insert, delete, and update advertisements
    - **Advertising Service ASE Server** - provides COTS relational database for the Advertising Service

- **Earth Science Online Directory (ESOD) Component**
  - **Three main processes**
    - **Advertising Service HTML Interfaces** - uses the HTML Framework to build the actual HTML files viewed by users
    - **Advertising Service HTTP Server** - receives and interprets the Hypertext Transfer Protocol (HTTP) from ESOD web pages
    - **ESOD HTML Communications** - Common Gateway Interface (CGI) programs to forward requests to the Advertising Server and receive results back

Subsystems and CSCIs: IOS (Cont.)
ADSRV Architecture and Interfaces

Subsystems and CSCIs: IOS (Cont.)

User Registration, Order Status, User Profile

Communications (CSS)
Internetworking (ISS)
Operational Support (OSS)
PUSH

Client (CLS)
External/ Internal Users

Discovery/ Advertisements

Interoper– ability (IOS)

System Mgmt Subsystem

Planning Subsystem (PLS)

Advertising Server
EcloAdServer

Advertising Service ASE Server
Sybase Server (COTS)

Advertising Server Component

Advertising Service HTML Interfaces
Earth Science Online Directory

Advertising Service HTTP Server
Netscape Enterprise Server (COTS)

ESOD HTML Communications
Common Gateway Interface (CGI)

Earth Science Online Directory (ESOD) Component

Advertising Service (ADSRV) CSCI
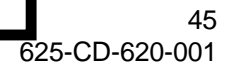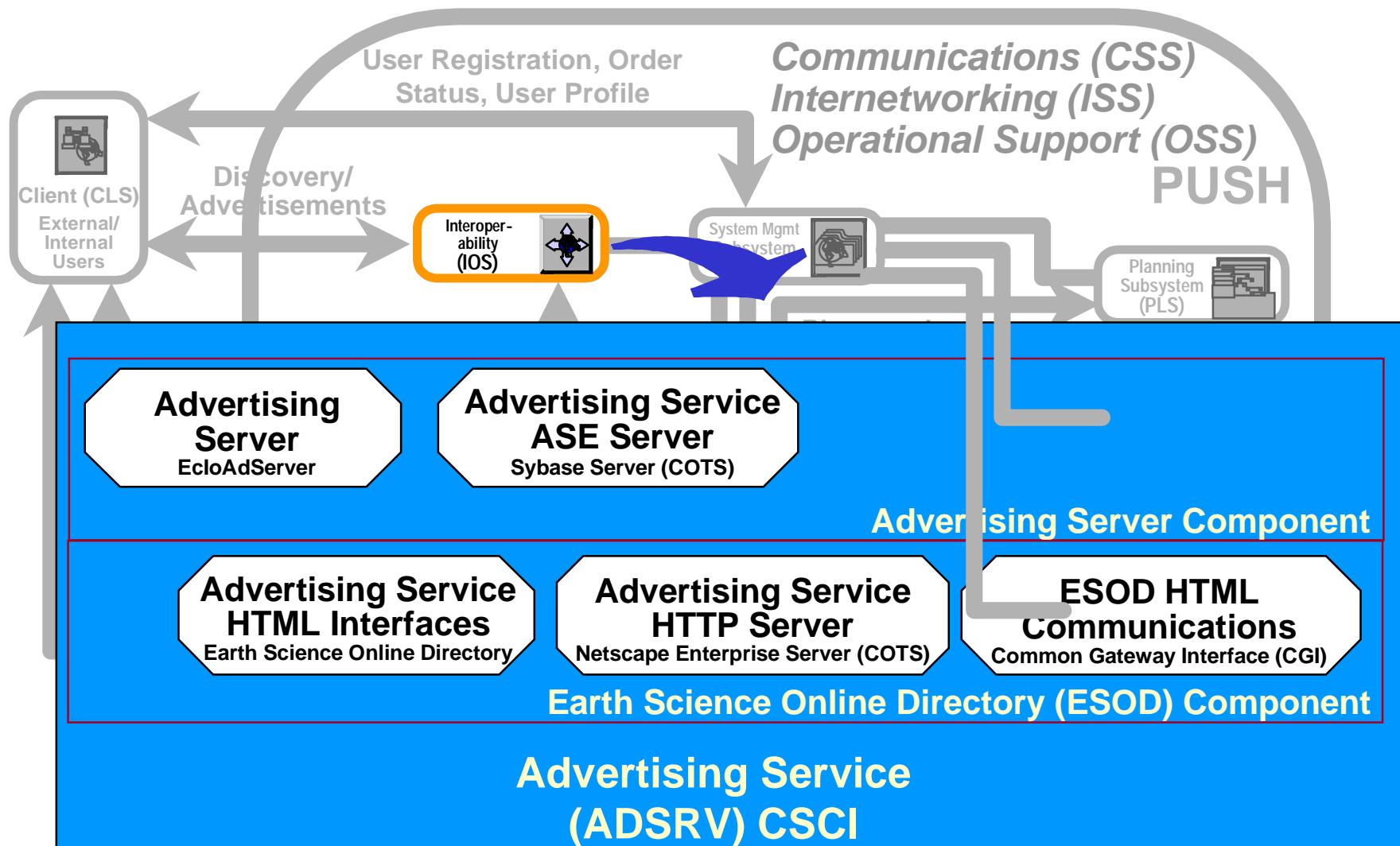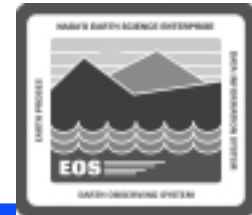
Subsystems and CSCIs: PLS
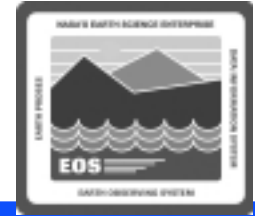
- **Planning Subsystem (PLS)**
  Planning Subsystem | Planning
    - **Allows operations staff to define data processing tasks to be performed at a site**
    - **Generates efficient plans for scheduling defined data processing and reprocessing tasks according to production rules that define how a Product Generation Executive (PGE) is to run**
    - **Coordinates production with the Data Server and Data Processing subsystems to achieve a highly automated production system**
    - **Interfaces with the Algorithm Integration and Test Tools CSCI within DPS for information on Product Generation Executives (PGEs)**
    - **Permits entry of Production Requests and generates resulting Data Processing Requests (DPRs)**
    - **Uses a set of Raytheon-provided COTS libraries as a basis for its scheduling components (Resource Planning Workbench and Production Planning Workbench)**

Subsystems and CSCIs: PLS (Cont.)
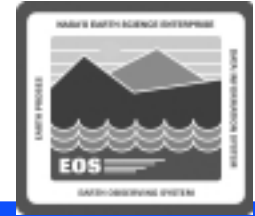
- **Production Planning (PLANG) CSCI**
  - **Seven major components**
    - **Data Store** - handles insertion of data for planning and processing activities into the PDPS shared database
    - **Resource Planning Workbench** - GUIs for preparing a site resource schedule [Resource Editor (EcPlRpRe), Scheduling Interface (EcPlRpSi), Timeline (EcPlRpTl)]
    - **Production Request Editor** - GUI for submitting production requests that describe the data products to be produced; uses PGE descriptions to generate the DPRs necessary to meet the requests (EcPlPREditor_IF)
    - **Production Planning Workbench** - GUIs for preparing a site pro-duction schedule [Workbench (EcPlWb) and Timeline (EcPlTl)]
    - **On-Demand Production Request Manager** - receives requests for data from the scientist via the ODFRM web page, generates the necessary Production Request, submits it for processing, and distributes the data to the scientist (EcPlOdMgr)
    - **Subscription Manager** - server to manage receipt of subscrip-tion notifications from the Data Server via SBSRV (EcPlSubMgr)
    - **Production Strategies GUI** - used to create a set of planning priorities to be applied to each DPR in a plan (EcPlProdStrat)

Subsystems and CSCIs: PLS (Cont.)
PLANG Architecture and Interfaces

CLS

EcPlOdMgr

EcPlPREditor_IF

IOS

DSS

DMS

ASE
(Sybase)

PDPS
Database

DPS

EcPlTl

MSS

EcPlWb

EcPlRpRe

EcPlRpSi

EcPlRpTl

EcPlProdStrat

CSS

EcPlSubMgr

Subsystems and CSCIs: PLS (Cont.)

User Registration, Order Status, User Profile

Communications (CSS) Internetworking (ISS) Operational Support (OSS)

PUSH

Client (CLS) External/

Discovery/ Advertisements

Planning Subsystem (PLS) | Planning

Data Processing Requests

Data Store
Sybase Database (COTS)

Resource Planning Workbench
EcPlRpRe
EcPlRpSi
EcPlRpTl

Production Request Editor
EcPlPrEditor_IF

Production Planning Workbench
EcPlWb
EcPlTl

Data Processing System (PS)

On-Demand Production Request Manager (ODPRM)
EcPlOdMgr

Subscription Manager
EcPlSubMgr

Production Strategies GUI
EcPlProdStrat

Ingest Subsystem (INS)

Production Planning (PLANG) CSCI

External Data Sources and Providers

50

625-CD-620-001

Subsystems and CSCIs: DPS

- **Data Processing Subsystem (DPS)**
  - **Manages allocation and recovery of computer resources (e.g., CPU, disk space) used in processing science data**
  - **Manages, queues, and executes DPRs**
  - **Supports execution of science algorithms through the Science Data Processing (SDP) Toolkit**
  - **Supports preliminary processing of ancillary data sets**
  - **Provides an Algorithm Integration and Test (AIT) environment for the introduction of science software**
  - **Provides a Quality Assessment (QA) environment for updating the quality flags in metadata for data products**
  - **Uses COTS tools**
    - **AutoSys: a job scheduling software application to automate operations in a distributed UNIX environment**
    - **AutoXpert: provides mechanisms and GUIs to monitor and manage the job schedule being processed in AutoSys**
    - **Sybase: ASE server**

Subsystems and CSCIs: DPS (Cont.)
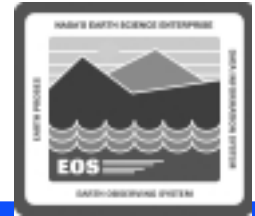
- **Processing (PRONG) CSCI**
  - **Provides services required to manage and monitor the Science Data Processing environment, which executes Science Software items (PGEs) and produces data products**
  - **Ten major components**
    - **Job Management** - handles flow of information to the COTS products; also creates and starts Ground Event jobs
    - **Data Management** - handles flow of science data to and from science processing resources
    - **Execution Management** - initiates execution of PGEs and performs final activities subsequent to execution of PGEs; also provides status of On-demand Processing requests
    - **PGE Management** - controls and monitors execution of PGEs and the growth of the output products (EcDpPrRunPGE); measures and reports resource use to AutoSys (EcDpPrRusage)

Subsystems and CSCIs: DPS (Cont.)
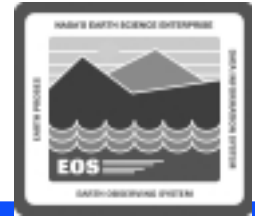
- **Processing (PRONG) CSCI (Cont.)**
  - **Ten major components (Cont.)**
    - **Deletion Server** - notifies Science Data Server to remove interim granules that are no longer needed
    - **Quality Assurance Monitor** - supports visualizing science data products and updating QA metadata
    - **Data Preprocessing** - manages preprocessing of ancillary data used as inputs to a PGE
    - **AutoSys** - provides the job scheduling engine (COTS)
    - **Data Store** - handles insertion of data for planning and processing activities into the PDPS shared database
    - **Ground Event Process** - initiated by Job Management upon receipt of a ground event request; sets a computer resource to an off-line state, making it unavailable for PGEs during the request

Subsystems and CSCIs: DPS (Cont.) PRONG Architecture and Interfaces

EcDpPrFddAttitudeDPREP
EcDpPrAm1EphemerisGapFillDPREP
EcDpPrAm1FddReplaceEphemerisDPREP
EcDpPrDumpAttitudeDPREP
EcDpPrDumpEphemerisDPREP
EcDpPrAm1AncillaryDPREP

EcDpPrPm1DefAttitudeDPREP
EcDpPrPm1PredAttitudeDPREP
EcDpPrPm1DefFddEphemerisDPREP
EcDpPrPm1PredFddEphemerisDPREP
EcDpPrAm1ToolkitToHdfDPREP

EcDpPrDM

CSS

EcDpPrDeletion

AutoSys

EcDpPrRunPGE
EcDpPrRusage

**ASE
(Sybase)**

**PDPS
Database**

IOS

DSS

EcDpPrViewJobStates

EcDpPrQaMonitorGUI

EcDpPrJobMgmt
EcDpPrJobMgmtClient

PLS

EcDpPrEM

User

EcDpPrGE

MSS

Subsystems and CSCIs: DPS (Cont.)

- **Algorithm Integration and Test Tools (AITTL) CSCI**
  - Provides a set of tools used for testing and integration of new science software, new versions of science software, and user methods into the Science Data Processing operational environment
  - Combines custom-developed code with COTS software
  - Tools are accessed from a centralized application called the Science Software Integration and Test (SSIT) Manager

Subsystems and CSCIs: DPS (Cont.)
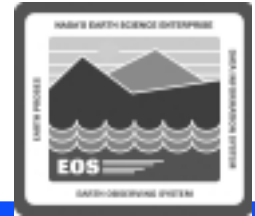
- **Algorithm Integration and Test Tools (AITTL) CSCI (Cont.)**
  - **Six major components**
    - **Science Software Archive Package (SSAP) GUI** - allows for the creation, update, and deletion of SSAPs
    - **SSIT Manager** - GUI for SSIT activities; provides menus to launch other SSIT applications and a checklist to mark completion of SSIT functions
    - **Define PGE** - a group of applications to specify a PGE in the PDPS database
    - **View/Compare Tools** - a group of applications for viewing and comparing data files
    - **Check Software Tools** - a group of applications that check the source code for PGEs and their process control files (PCFs) for errors or prohibited functions
    - **Insert/Acquire Tools** - a group of applications that provide mechanisms to insert and acquire data items from Data Server

Subsystems and CSCIs: DPS (Cont.)
AITTL Architecture and Interfaces

Subsystems and CSCIs: DPS (Cont.)
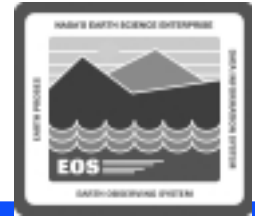
- **SDP Toolkit (SDPTK) CSCI**
  - **Provides a set of software libraries used to integrate Science Software into ECS**
  - **Allows Science Data Processing to support generation of data products in a heterogeneous computer hardware environment**
  - **Not described in detail in this course**

Subsystems and CSCIs: DPS (Cont.)

Data Management
EcDpPrDM

Execution Management
EcDpPrEM
EcDpPrSMFLink

PGE Management
EcDpPrRunPGE
EcDpPrRusage

(Separate software libraries for SSI&T)

SDP ToolKit (SDPTK) CSCI

Deletion Server
EcDpPrDeletion

Job Management
EcDpPrJobMgmt
EcDpPrJobMgmtClient
EcDpPrViewJobStates

AutoSys
COTS Product

Data Preprocessing
EcDpPrAm1AncillaryDPREP
EcDpPrAm1EphemerisGapFillDPREP
EcDpPrFddAttitudeDPREP
EcDpPrAm1FddReplaceEphemerisDPREP
EcDpPrAm1ToolkitToHdfDPREP
EcDpPrDumpAttitudeDPREP
EcDpPrDumpEphemerisDPREP
EcDpPrPm1DefFddEphemerisDPREP
EcDpPrPm1PredFddEphemerisDPREP
EcDpPrPm1DefAttitudeDPREP
EcDpPrPm1PredAttitudeDPREP

QA Monitor
EcDpPrQaMonitorGUI

Ground Event Process
EcDpPrGE

Data Store
Sybase Database (COTS)

Processing (PRONG) CSCI

Data Processing Subsystem (DPS)
Data Proc

SSAP GUI
EcDpAtSSAPGui

Define PGE
EcDpAtCheckODL
EcDpAtCreateODLTemplate
EcDpAtRegisterPGE
EcDpAtOpDbGui

Insert/Acquire Tools
EcDpAtINSTALL
EcDpAtInsertStaticFile
EcDpAtInsertExeTarFile
EcDpAtInsertTestFile
EcDpAtStageDAP
EcDpAtGetMCF

View/Compare Data Tools
EOSView, IDL
EcDpAtBinDiffGui
EcDpAtBinDiffPrepareFiles
EcDpAtCheckHdfFile
hdiff, xdiff

Check Software Tools
EcDpAtCheckPCF
EcDpAtBadFuncGui
EcDpAtBadFunc
EcDpAtPrologs
EcDpAtReplaceString

SSIT Manager
EcDpAtMgr
EcDpAtMgrLogDump

Algorithm Integration and Test Tools (AITTL) CSCI